

Turbo Power Services



Fuel System Solutions

Introduction

Founded in 1985, Turbo Power Services (TPS) specialises in the supply, overhaul and upgrade of gas turbine auxiliary and fuel system components for the oil, gas, petrochemical and power generation industries.

With facilities located in the UK and UAE servicing a customer base of over 80 countries, TPS operates successfully on a global scale, working with major Original Equipment Manufacturers, service companies and end users of light industrial, heavy industrial and aeroderivative gas turbines.

Components are overhauled, tested and calibrated in-house at TPS's state-of-the-art service centres, using custom-built test rigs that can replicate varying engine and test conditions.

TPS offers rapid repair and performance testing in accordance with OEM specifications. By working closely with its customers TPS has established a proven track record of increasing efficiency and performance of rotating equipment and minimising downtime during outages.

Specialists in the supply, overhaul and testing of gas turbine auxiliary components.

- ▶ Fuel Nozzles
- ▶ Control Valves
- ▶ Atomising Air and Boost Compressors
- ▶ Flow Dividers
- ▶ Fuel Pumps and Hydraulic Motors
- ▶ Outage Support
- ▶ Engineering Services



Providing specialist support to the gas turbine service industry

Capabilities

With over 40 years' experience and a proven supply chain, TPS engineers can offer a wealth of knowledge and support to help increase efficiency and performance of rotating equipment. TPS operates a number of bespoke test rigs designed to accurately measure and analyse pressure, air flow and liquid fuel flow within the fuel system. TPS proudly operates the only approved flow divider test rigs in the UK that are built to Roper specifications. These bespoke test rigs can be manually or automatically controlled and possess the ability to generate fully automated test reports.

Housed in state-of-the-art service centres in the UK and UAE, TPS is fully supported by dedicated technicians, engineers and inspection teams to assist with overhaul, test and project management functions. TPS is able to tailor processes to meet the needs of individual customers to their specific project requirements.

Cleaning and Process equipment:

- ▶ High pressure jet wash
- ▶ Solvent degreasing tanks
- ▶ Chemical soak tanks
- ▶ Shotblast cleaning
- ▶ Aquablast cleaning
- ▶ Ultrasonic cleaning and back flushing

Inspection Equipment:

- ▶ Faro™ arm portable CMM inspection
- ▶ Kemet™ optical flats
- ▶ Sigma lateral clearance comparator
- ▶ Precision bore gauges
- ▶ Workshop metrology equipment
- ▶ Borescope inspection
- ▶ Vibration measurement analysis
- ▶ NDT - Dye penetrant / Ultrasonic

TPS also offers the following supplementary services:

- ▶ Fault-finding and Diagnosis
- ▶ Failure investigation
- ▶ Root cause analysis
- ▶ Upgrades
- ▶ Positive material identification
- ▶ Rotor balancing
- ▶ Shaft straightening
- ▶ Special coatings
- ▶ Sealing analysis
- ▶ Bespoke test procedures





Fuel Nozzles

TPS specialises in the supply, refurbishment and flow testing of fuel nozzles, ranging from single fuel nozzles to complete combustor cover assemblies.

- ▶ DLN Fuel Nozzles
- ▶ DF Conventional
- ▶ Industrial
- ▶ Aeroderivative

Bespoke test rigs

TPS has specialist in-house test rigs for air and liquid fuel testing of fuel nozzles and assemblies. All calibration is fully traceable to UKAS sources.

With a wealth of knowledge and experience in designing and manufacturing bespoke test rigs, TPS can build, commission and offer training on the following test stands:

- ▶ Liquid Fuel Nozzle Calibration
- ▶ Gas Nozzle Air Flow Calibration

Internal processes include the strip, clean, inspection, rebuild and test of assemblies, and the replacement of consumable parts and worn components.

TPS can provide comprehensive test reports on mass or volumetric air flow rates, spray cone characteristics, cone angle, spread and pressure testing.

As part of the OEL Group, TPS is able to supply and continue to develop a wide range of auxiliary gas turbine components that are compatible with OEM components.



Valves

TPS understands the critical importance of the different types of valve that are responsible for the safe running and operation of a gas turbine. TPS refurbishes and tests all valves as complete assemblies to ensure that the valves function correctly and comply with the operational specification when refitted to the turbine, minimising downtime and maximising reliability. TPS overhauls valves from every stage of the turbine and associated systems according to relevant industry standards.

TPS technicians are trained by valve OEMs to ensure that they have the correct product knowledge and skills to perform a high quality overhaul in line with required specifications. These skills are supplemented by our extensive product knowledge and engineering expertise acquired since our founding in 1985.

Repair and overhaul

- ▶ Electrically operated
- ▶ Pneumatically operated
- ▶ Hydraulically operated
- ▶ Fuel valves (Liquid / Gas)
- ▶ Bleed valves (Air)
- ▶ Solenoid trip valves
- ▶ False start drain valves
- ▶ Temperature regulating (Air / Oil)
- ▶ Purge valve (Air / Oil)
- ▶ Check valves
- ▶ Servo valves

Functional tests

- ▶ Trip function
- ▶ LVDT testing
- ▶ Hysteresis
- ▶ Stem leakage
- ▶ Seat leakage
- ▶ Pressure testing
- ▶ Flow measurement
- ▶ Electrical operation



UK and Europe Approved Agent

Representing United Kingdom, Portugal, Spain, Ireland, Luxembourg, Belgium, Netherlands, Denmark, Norway, Sweden, Finland, Iceland, Greenland and French Colonies



Atomising Air Compressors

TPS is able to fully overhaul, repair and test atomising air compressors and booster pumps for GE turbines.

Commissioning TPS to carry out a comprehensive service of the unit will offer significant cost savings in comparison to purchasing a new OEM unit. TPS is able to service units from a range of manufacturers, including:

- ▶ Atlas Copco
- ▶ Turbonetics
- ▶ Gardner Denver
- ▶ Dresser Rand

Typical repair scope:

- ▶ Sourcing and replacement of all parts
- ▶ Rebabbiting of bearings
- ▶ Balancing of rotor
- ▶ Shaft diameter recovery
- ▶ Refacing of drive gear thrust faces
- ▶ Leak check glands and seal faces
- ▶ Spin test to check clearance
- ▶ Rotable repair service*

*subject to availability

Through a progressive approach of continued development, TPS is the perfect facility for both the repair of components and provision of full support and investigation into component faults and failures.



Pumps & Motors

TPS specialises in the supply and repair of fuel pumps, hydraulic oil pumps, lube oil pumps and hydraulic motors. All refurbished pumps are performance tested and returned with a twelve month warranty. As an authorised sales and repair centre for Roper Pumps USA, you can be assured that all work is carried out to meet or exceed OEM specifications.

Our engineers are subject matter experts in hydrostatic and hydrodynamic pumps but TPS also offers refurbishment of the following types of pumps:

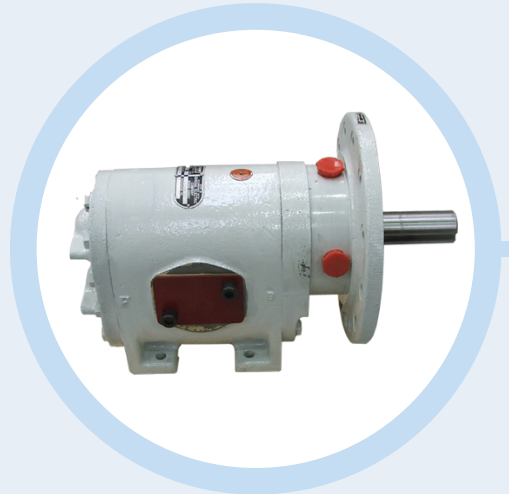
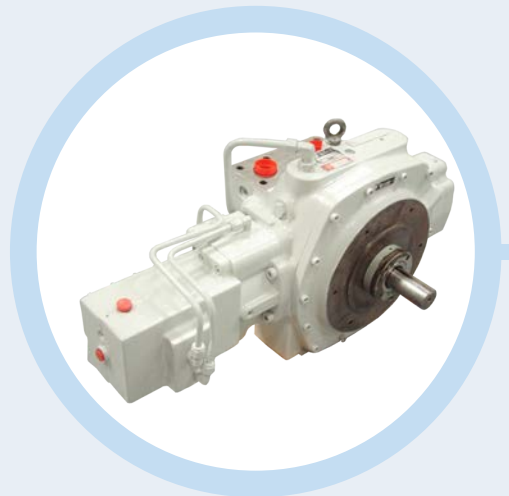
- ▶ Fuel pumps
- ▶ High pressure pumps
- ▶ Lubrication oil pumps
- ▶ Twin and triple screw pumps
- ▶ Gear pumps
- ▶ Axial piston pumps
- ▶ Radial piston pumps
- ▶ Impeller

Support for the following manufacturers:

- | | |
|--------------------|-------------------|
| ▶ Roper | ▶ Delevan |
| ▶ Shimadzu/Hitachi | ▶ Haartman |
| ▶ IMO | ▶ Woodward |
| ▶ Oilgear | ▶ GEC |
| ▶ Dynapower | ▶ Alstom Scam-IMO |
| ▶ Warren | ▶ Vickers |



Approved Sales and Repair Centre



Flow Dividers

Approved Sales and Repair Centre for Roper Pumps

With over 20 years' experience overhauling radial and linear flow dividers, TPS can offer full support for the following manufacturers across Europe, the Middle East and North Africa.

- ▶ Roper
- ▶ Scherzinger
- ▶ Shimadzu
- ▶ Hitachi

As an authorised sales and repair centre for Roper Pumps USA, TPS are supported by the necessary test equipment, parts and latest test procedures to ensure that flow dividers conform to the original OEM specifications.

- ▶ Repair - to original specification
- ▶ Upgrade - to corrosion-resistant Duraflow technology
- ▶ Replace - the ideal opportunity to upgrade

Upgrading to Duraflow technology improves corrosion resistance and increases service life. Upgraded units are resistant to failure from particulate contaminants in liquid fuel and offer high reliability during startup of liquid fuel systems.



Outage Support

At TPS we understand the weight of responsibility placed on engineering teams and managers during an outage. Our command of the operational pressure is reflected in our 100% outage OTD rate. This is something we are very proud of and all the work we undertake at TPS is with a view to maintaining our impressive record. “Can do – safely” is the mantra when our qualified Project Managers and Engineers work around the clock to meet your crucial maintenance deadlines.

We are passionate about positioning ourselves as the safest pair of hands in the industry for your high-commodity-value ancillary assets. We offer a holistic outage service, taking in entire packages of work that we return to site fully overhauled, certified and ready for a successful commissioning phase. Our philosophy is to integrate with our customers as fully as they will permit.

Planning is key and our experience tells us that the more fully TPS are involved in your planning, the less obstacles are likely to arise that jeopardise your critical path. We have never failed to deliver and this is reflected in the satisfaction of our customers.

- ▶ Pre-order of spare parts
- ▶ Rapid manufacturing
- ▶ Planning and logistics support
- ▶ Project management
- ▶ Expedited lead times

Testimonial

“I would like to express my thanks for all the support provided by the TPS team during our recent station outage.

The work scope, which encompassed overhaul of gas valves, actuators, hydraulic and lube oil pumps, was completed ahead of what was already a tight schedule. During the course of the overhaul works, numerous defects were identified which required additional remedial works and these were dealt with in a timely manner and at reasonable cost. We were also kept informed of these issues during the course of the work via daily updates which was much appreciated. Having all the equipment returned to site ahead of plan eased the burden on the sites limited resources and made the job of installing and calibrating the equipment prior to return to service an easier task. Please pass on my thanks to your team for a job well done and we look forward to working with you on future projects.”

Steve Latter, Mechanical Engineer, Centrica



Quality

It is the policy of Turbo Power Services to supply products that are fit for purpose and consistent with customer-specified requirements by an active and coordinated programme of defect prevention and continuous improvement using the relevant quality standards.

Procedures and improvements are cascaded throughout the company to ensure the same level of service is available on a global scale.

ISO 9001:2008 Certified

TPS is ISO 9001:2008 certified and duly undergoes mandated NQA audits. Senior management demonstrate robust leadership and 'hands on' integration with the QMS always ensuring that Total Quality Management is the vanguard of our business development strategy.

Continuous Improvement is embedded within the culture at TPS; our engineers actively drive ahead-of-time quality planning. This risk-based thinking ensures that controls identified through methodologies such as PFMEA are implemented where necessary to guarantee the quality of our workmanship first time, every time.



Engineering Services

Fuel System Optimisation

TPS's state-of-the-art service centres have the ability to overhaul and calibrate to the highest standards, providing a technical support service that is specific and relevant to our customers' products. TPS has the ability to calibrate and optimise the entire fuel system equal to or better than the OEM, ensuring reliable, efficient running.

Technical Guidance and Support

TPS will provide guidance and support in identifying repair requirements. We will collect technical data as required and present a pre-repair inspection report, supplemented by a quotation to restore your assets to an optimum condition.

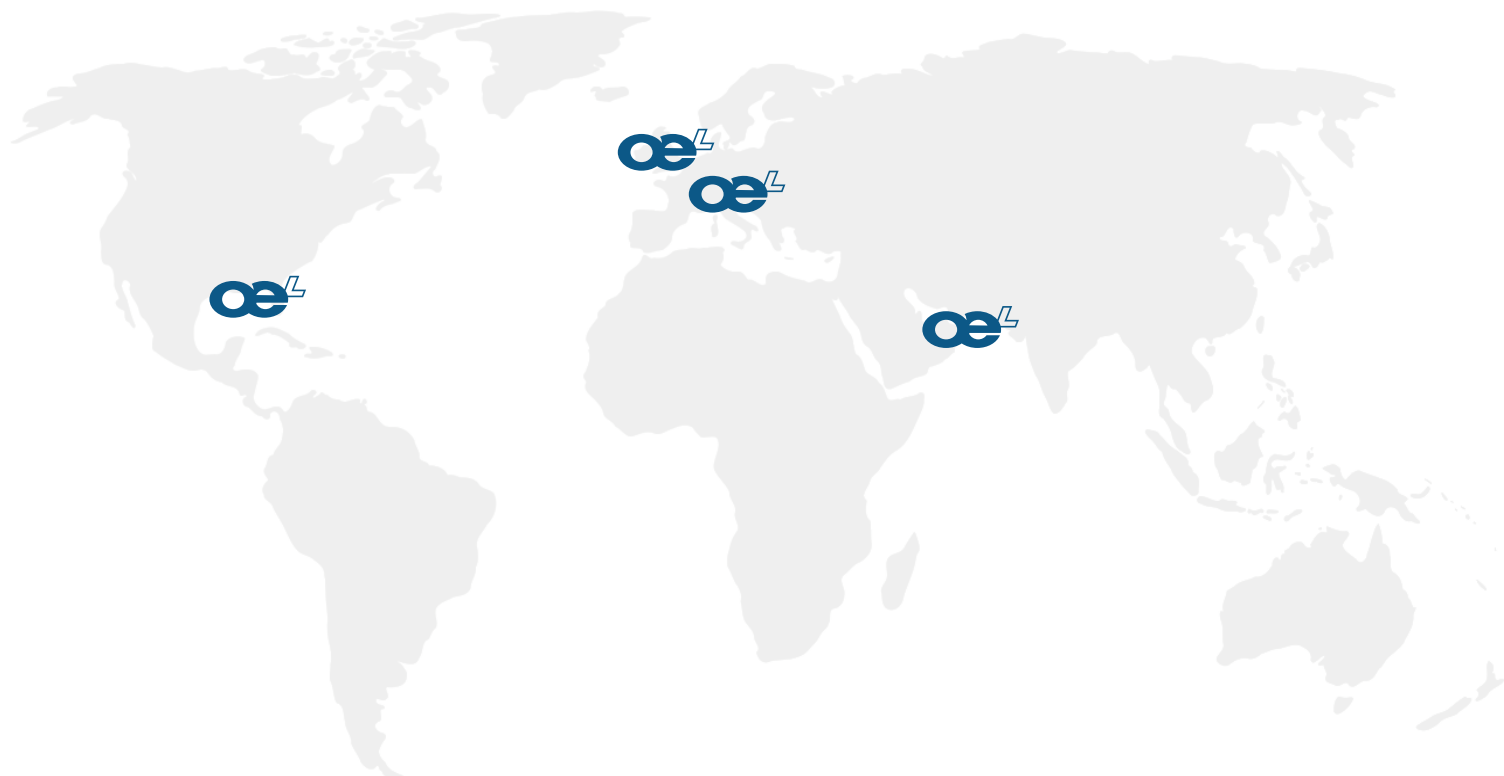
Failure Analysis and Upgrades

TPS's procurement and engineering excellence enables rapid solutions to unscheduled breakdowns and repairs. Our extensive knowledge of ancillary components allow us to track repeated failures and develop solutions and upgrade options.

Reverse Engineering

TPS's engineers are able to offer continued support for obsolete product through a programme of reverse engineering and testing. This allows TPS to offer an alternative to OEM products, combating lead times in the event of a breakdown.





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